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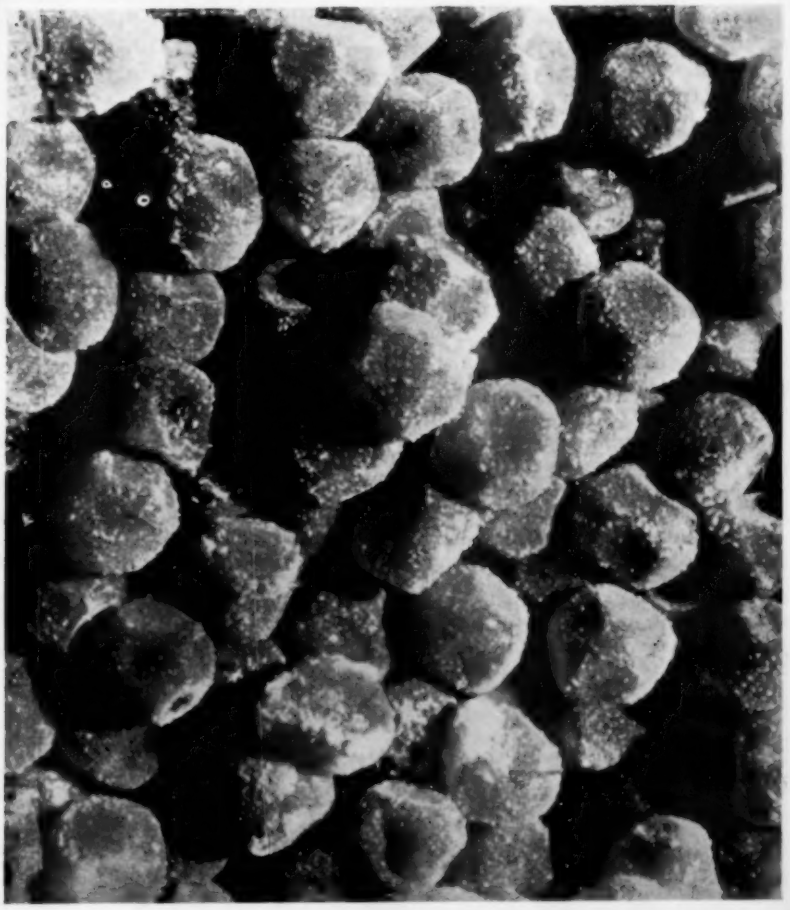
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



APRIL 9, 1932

In Arachne's Nursery

See Page 228

A SCIENCE SERVICE PUBLICATION

SCIENCE NEWS LETTER

VOL. XXI *No. 574*

The Weekly Summary of Current Science

Published by

SCIENCE SERVICE

The Institution for the Popularization of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science.

Edited by WATSON DAVIS

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? DO YOU KNOW THAT ?

An orang-utan looks as disgusted and sorrowful in the wild as it does in the zoo, says C. E. Brown, director of the Philadelphia Zoological Garden.

In 1922, it required about 12 minutes to complete a telephone connection of the toll or out-of-town type, whereas it now takes about two minutes.

An American firm has produced a water-proof glue with the casein of soy beans.

A new map published by the U. S. Geological Survey covers an area of Virginia including Wakefield, birthplace of George Washington.

The depth of the famous Royal Gorge of the Arkansas River is found to be surpassed by the canyon of the New River, in West Virginia, which reaches a depth of 1,200 feet.

For over a year, a lighthouse in the Firth of Clyde has been broadcasting its fog horn and other signals by radio.

In the Samoan Islands, the deity presiding over warfare is a goddess.

A British insurance expert reports that bulldogs and Saint Bernards are poor insurance risks, whereas terriers and hunting dogs are good risks.

Aluminum is having competition in industry from another light material, metallic magnesium, which is obtained from brines pumped out of deep wells.

A buck deer recently shot in Pennsylvania had two legs growing directly back of the ordinary hind legs and used all six legs in running and jumping.

The White House Conference on Child Health and Protection found that there are 1,000,000 school children with weak or damaged hearts in this country.

Chemical tests show that fossil skeletons of dinosaurs still contain, after millions of years, some of the organic matter of the living animal, says a geologist of the Field Museum.

A sign language of finger and arm gestures has evolved in radio studios, for use in directing performers and technical workers.

WITH THE SCIENCES THIS WEEK

CURIOSITY-AROUSING questions are prepared concerning the most interesting and important news in each issue. These questions should be a mental stimulant for the adult reader and a boon to the teacher who uses the Science News Letter to add zest to her classroom instruction.

Book reference in italic type is not the source of information of the article, but a reference for further reading on the subject of the article. Books cited can be supplied by Librarian, Science Service, at publisher's price, prepaid in U. S.

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What was done with the valuables found in the new Mexican tomb? p. 233

BIOLOGY

What is the effect of color in butterfly wings as regards photographic emulsion? p. 225

CHEMISTRY

Why is analysis of the rare earths difficult? p. 223

What effect does sulfur have on dried fruit? p. 224

What is ramie? p. 224. *Chemistry in the World's Work—H. E. Howe—Van Nostrand*, 1926, $3.

What is the name of the new castor oil derivative? p. 224.

What vitamin do fruit juices contain? p. 234. *The Vitamins—H. C. Sherman and S. L. Smith—Chemical Catalog Co.*, 1931, $6.

ECONOMICS

Where does tung oil come from? What are its uses? p. 234

EMBRYOLOGY

What point in embryology did the new monkey colony clear up? p. 230

ENTOMOLOGY

Is the "thousand-legger" poisonous? p. 235

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GEOLOGY

Where is a dump cart for glaciers? p. 232

MEDICINE

What happens to the tongue during pernicious anemia? p. 228

What has been recently used to prevent the corrosive action of the gastric juice on the stomach lining? p. 232. *Diseases of the Stomach—Hugh Morton—Longmans*, 1931, $4.

What is the new weapon to use against scarlet fever? p. 233

Why is use of the tourniquet held bad practice? p. 231

MICROBOLOGY

What groups of microorganisms are responsible for the spoilage of frozen foods? p. 228

PHOTOGRAPHY

What rays enable a picture to be taken through hazy atmosphere? p. 223

PHYSICS

Why does the neutron leave no finger-prints? p. 230. *Atoms, Molecules, and Quanta—A. E. Ruark and H. C. Urey—McGraw-Hill*, 1930, $7.

ZOOLOGY

How fast does the blue racer snake travel? p. 235

CHEMISTRY

Super-Sensitivity of New Research Tool Is Confirmed

Illinois Investigators Devising Improvements to Make Magneto-Optic Method Dependable for Laboratory Routine

"A POWERFUL new tool for research, one thousand times more sensitive than the most delicate methods of analysis now used," is the report Dr. B. S. Hopkins and Dr. Gordon Hughes of the University of Illinois gave the American Chemical Society following a study of the magneto-optic method of analysis developed by Dr. Fred Allison of Alabama Polytechnic Institute, and used in the discovery of the last two chemical elements.

The Illinois scientists are devising improvements to Dr. Allison's method which they expect will make it a dependable tool for routine use in the laboratory—one with which the limits of human knowledge can be extended to present "unknowns" where infinitesimals of one-millionth of one per cent. are matters of importance.

Methods Compared

Dr. Hopkins and Dr. Hughes found that the magneto-optic method surpasses a thousand times analysis by arc spectra, its nearest rival in sensitivity. The limit of accuracy of the X-ray spectra method is one-tenth of one per cent., Dr. Hughes said; the arc spectra will analyze to one thousandth of one per cent., depending on the substance under examination, and the magneto-optic method easily extends this limit to one millionth of one per cent. This accuracy is achieved in analysis of rare earths, that part of the periodic table where analysis is most difficult because the elements are so closely "jammed together" there.

The Allison method uses simple apparatus, which costs much less than that required in other forms of analysis. Two hundred dollars would cover the cost of that employed in the University of Illinois investigations, it was stated.

Dr. Hopkins and Dr. Hughes also reported that the Allison analysis requires a much smaller "sample" than other methods and that the substance is not destroyed as is the case with the chief forms of analysis now used.

But their investigations have led them to agree with other scientists who have found that the Allison method in its present form is not dependable.

"Results are obtained from the instrument by noting faint light flickers with the eyes," Dr. Hopkins told Science Service. "Dr. Allison and his workers have trained themselves to make these observations and they have become very efficient, but others have tried reading with the eye and they have found that they cannot depend on it.

"Our work has been directed at eliminating this fault," he continued. "Dr. Hughes has already improved the light source, a spark which has been unsteady. He is now developing a photographic method of reading the 'minima.' The faintly varying light makes a record on a very sensitive moving photograph plate and this is examined under a microphotometer, which is much more accurate than the eye in locating the spot of slight light variation."

"The next step will be the making of two photographic records," Dr. Hughes said, "one to picture light after it passes through the liquid being analyzed and the other to show light made from the same source but which does not pass through the liquid. This refinement is expected to make it easier for us to pick out the 'minima' variations from other fluctuations such as those caused by the spark flicker and by photographic emulsion granulations."

The scientists then expect to apply the photoelectric cell to the apparatus so that readings can be taken automatically. Sufficiently sensitive cells are already available, Dr. Hopkins said.

One field of science which is expected to be benefited by use of the improved apparatus is the study of minute traces of minerals and metals in food.

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PHOTOGRAPHY

Camera Reveals Mountain Not Seen by Aviator

A NEW record in long-range photography was made about a month ago by Capt. Albert W. Stevens of the U. S. Army Air Corps from a plane flying near Salinas, Calif., 80 miles south of San Francisco. His picture shows Mt. Shasta, 331.2 miles distant.

The previous distance record was made by Capt. Stevens last year in South America with a 320-mile view of a peak in the Andes. Even from a height of 23,000 feet, Capt. Evans could not see Mt. Shasta; he pointed his camera by compass. Krypto- (*Please turn page*)

U. S. Army Air Corps

NEW LONGEST-RANGE PHOTOGRAPH

cyanine film, developed in Eastman research laboratories, reproduced the picture from penetrating infra-red rays that pierced the hundreds of miles of haze obscuring the view.

Science News Letter, April 9, 1932

CHEMISTRY

Opiates Found Related to Essential Elements of Diet

Research Shows Substance Giving Benefits of Vitamin C Can Be Prepared from Derivative of Harmful Drug

CHEMISTS are building a bridge over the seemingly impassable gap between destructive, habit-forming drugs and essential, building elements of diet, it appears from a report made to the closing session of the American Chemical Society. From an alkaloid derived from the age-old drug, opium, there may come after a series of chemical changes a substance bringing the benefits of the anti-scurvy vitamin C, possibly the vitamin itself.

Spurred by the recent discoveries which indicate that the effects of vitamin C can be gotten from a substance easily made from narcotine, a by-product in the manufacture of morphine from opium and which is now of little value, chemists throughout the world are racing to learn more about narcotine and its compounds. Progress of an American laboratory was described by Dr. Carl R. Addinall, research chemist of Rahway, N. J. He told how he has made from narcotine, by methods simpler and more general than those used in the past, a number of compounds, the proportions and transformations of which may become valuable allies in the investigation of citrus fruit juices and other foods well supplied with vitamin C.

Dr. Otto Rygh, Norwegian chemist, announced at the first of the year that by heating narcotine with hydrochloric acid he had obtained a substance very much like vitamin C, possibly the vitamin itself. He admitted, however, that it is likely to be a mixture of the potent substance with impurities. When he fed it to guinea pigs suffering from scurvy, the pigs were cured of the vitamin C deficiency disease.

The claims of Dr. Rygh are contested by a prominent English biochemist, Dr. Silva, who reports that the substance he prepared from narcotine by the method adopted by Dr. Rygh did not cure guinea pigs of scurvy. The work of the Norwegian chemist is now being examined in other laboratories throughout the world.

Science News Letter, April 9, 1932

CHEMISTRY

New Method May Result In Cheap Supply of Ramie

A NEW cellulose industry for America seems to be a step nearer reality following the development in laboratories at Louisiana State University of a method of treating ramie to obtain from it longer and stronger fibers than are now available from cotton, flax or hemp. The work is being carried on by Dr. P. M. Horton of Louisiana State University, and G. L. Carter of the University of Virginia, and was reported to the American Chemical Society by Mr. Carter.

The unusual durability and strength of ramie have been known to the world since ancient Egyptians used it for wrapping those mummies which have been best preserved for modern examination. But the only processes that have ever been available for separating the useful fiber from the worthless parts of the stalk are slow and expensive and are carried out entirely by hand labor.

By chemical means of digestion and bleaching Dr. Horton and Mr. Carter report that they have separated the fiber from its closely clinging bark and have given it a clean white color with practically no loss of strength.

There remains, it was pointed out, the separation of the fiber and bark from the interior pulp and woody tissue. In the laboratory this was easily accomplished by hand. The development of a machine for this simplified operation is not expected to be difficult. The many machines of the past, all of which have been failures, have attempted to separate the fiber from both the outer bark and the inner wood and pulp.

If the laboratory method of separating the fiber from the bark, which has been developed at Louisiana State University, can be applied commercially, chemists agree that one of the greatest difficulties preventing the extensive use of ramie in industry will be overcome.

Science News Letter, April 9, 1932

CHEMISTRY

Sulfur Dioxide Harmless As Food Preservative

DRIED FRUITS preserved by treating with sulfur dioxide, the pungent gas obtained by burning sulfur, are not actually harmful, Dr. P. F. Nichols and Prof. W. V. Cruess of the

CHEMISTRY

Castor Oil Yields Drug That "Unpoisons" Cobra Venom

THERE IS MORE to castor oil than the rebellious small boy or even his insistent parents ever imagined. For from it a drug has been made that takes the poison out of poisons. It renders harmless the quick death-dealing venom of the cobra and rattlesnake, as well as those sluggish, ill-defined toxins in the bowels of man which are responsible for the condition commonly known as auto-intoxication.

Sodium ricinoleate, better known as soricin, is the name of this castor oil derivative. The intricate process leading to its isolation is described by Dr. Theodore H. Rider.

The action of soricin merely removes the toxic properties of the bacterial toxins and other poisons and leaves their other properties intact, according to Dr. Rider. Thus a toxin such as that of tetanus or diphtheria, when detoxified by soricin, is said still to retain the power of producing immunity even though it is no longer a dangerous poison.

Science News Letter, April 9, 1932

REVERSED

Common swallow-tail butterfly, with prints from "self-photographed" plate substituted for left wings. It will be noticed that the colors are reversed, being light where the natural colors are dark, and vice versa.

University of California told the American Chemical Society meeting.

The use of sulfur dioxide or sulfurous acid, said Prof. Cruess, greatly improves the appearance of the dried fruit and keeps it fresh longer. Sulfurous acid is also essential to the preservation of vitamins A and C in the fruit.

"In dried fruits," it was stated, "the sulfurous acid is largely in combined form, which has been shown to be nearly or quite harmless. No harmful effects have been shown to result from the sulfurous acid in dried fruits even when eaten in excessive amounts."

No satisfactory substitute for sulfurous acid has been found for use in fruit drying. Sulfurous acid is formed when the pungent sulfur dioxide gas dissolves in the water of the fruit.

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MEDICINE

Medical Students Liable To Get Tuberculosis

MEDICAL students are particularly liable to develop tuberculosis, it appears from a survey of students of the University of Pennsylvania School of Medicine made by four members of the faculty, Drs. H. W. Hetherington, F. M. McPhedran, H. R. M. Landis and E. L. Opie.

Between 93 and 94 out of every 100 students examined had tuberculous infection. Among premedical students in college, the rate was slightly lower, being about 85 or 86 out of every 100, while among high school boys the rate was only between 77 and 78 per 100.

"Here is a problem for scientific medicine within its own gates," comments the *Journal of the American Medical Association.*

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BIOLOGY

Dead Butterflies Photograph Themselves Without Camera

WINGS that printed their own pictures on photographic plates in the dark are shown in a new book on the butterflies that can be found in and around Washington, written by Austin H. Clark of the U. S. National Museum and published by the Smithsonian Institution.

As described by Mr. Clark, the process of making such wing prints is a very simple trick, that anybody can do. It does not require even a camera. All you need is a supply of freshly-killed butterflies, some photographic plates and a dark room.

"The wings, cut from the butterflies, are attached to pieces of paper, black or white, with drops of shellac," Mr. Clark directs. "A fresh box of plates is opened in the dark room and the plates are removed. An old plate, or a piece of glass of proper size, is placed in the bottom of the box to form a firm and smooth backing for the paper with the wings, which is laid upon it. Then a fresh plate is placed, emulsion side down, upon the wings, another piece of paper with wings is placed upon the upper (glass) surface of this plate, a second fresh plate is placed, emulsion side down, upon these wings, and so on until all the plates have been replaced in the box, which is then closed and sealed and left in the dark room."

Although some dark wings will give results in as little as 12 hours, it is usually best to wait for a week or more before opening the box and developing the plates.

There is a direct relation between the color of the wings and their effect on photographic emulsion. The darker the color the more marked the effect; so that prints made from plates thus prepared will be negative pictures of the actual wings: dark where the wings were light, and vice versa.

The cause of this strange phenomenon is still unsettled. At first Mr. Clark was inclined to think there was some kind of radiation, like ultraviolet light from the wings. But a thin sheet of quartz, which is transparent to ultraviolet rays, stopped the effect just as completely as did common glass, through which ultraviolet will not pass. It is now considered most probable that the emanation is some kind of a gas, probably a compound of sulfur.

The effect can be obtained best with fresh material, though wings of butterflies kept in collections for as much as 30 years have yielded prints. In his study, Mr. Clark made use of 43 species of butterflies, most of them native to the United States.

Science News Letter, April 9, 1932

ASTRONOMY

Old Telescope Mirrors Satisfy Modern Standards

TWO TELESCOPE mirrors made more than a century and a half ago by Sir William Herschel, famous English astronomer and discoverer of the planet Uranus, "are fully up to modern standards, and would bear comparison with the best work of any modern artist." So declares Inst. Capt. M. A. Ainslie, British amateur astronomer, in a report to the British Astronomical Association. The two mirrors are of metal, which was commonly used for the purpose at that time, and each is 6.3 inches in diameter. Though the data concerning them are somewhat sketchy they seem unquestionably to have been the work of Herschel, and Capt. Ainslie suggests that one may have been the actual mirror that Herschel used when he discovered Uranus in 1781.

Capt. Ainslie tried them on the night sky and found that with a power of 450 diameters a close double star was plainly seen to consist of two bodies. He also tried them on Uranus, and found that it looked entirely different from nearby stars of similar brightness, appearing as a round disc instead of a point of light. This, he states, shows that Herschel, as an experienced observer, must have had no difficulty in recognizing that the body was not a star. Even if one of the mirrors is not that used in the discovery, there is no doubt that they are "exact counterparts," he said.

Several of the large mirrors which Herschel made later are still preserved at Herschel's home in Slough, where his granddaughters are living.

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BIOLOGY

Hand and Foot

Part I.

"A Classic of Science"

Apes are not "Quadrumana," but Have Hands and Feet Matching Man's, Muscle for Muscle and Bone for Bone

EVIDENCE AS TO MAN'S PLACE IN NATURE. By Thomas Henry Huxley. London and Edinburgh, Williams and Norgate, 1863.

WHATEVER part of the animal fabric—whatever series of muscles, whatever viscera might be selected for comparison—the result would be the same—the lower Apes and the Gorilla would differ more than the Gorilla and the Man. I cannot attempt in this place to follow out all these comparisons in detail, and indeed it is unnecessary I should do so. But certain real, or supposed, structural distinctions between man and the apes remain, upon which so much stress has been laid, that they require careful consideration, in order that the true value may be assigned to those which are real, and the emptiness of those which are fictitious may be exposed. I refer to the characters of the hand, the foot, and the brain.

Man has been defined as the only animal possessed of two hands terminating his fore limbs, and of two feet ending his hind limbs, while it has been said that all the apes possess four hands, and he has been affirmed to differ fundamentally from all the apes in the characters of his brain, which alone, it has been strangely asserted and re-asserted, exhibits the structures known to anatomists as the posterior lobe, the posterior cornu of the lateral ventricle, and the hippocampus minor.

Surpassing Courage . . .

That the former proposition should have gained general acceptance is not surprising—indeed, at first sight, appearances are much in its favor: but, as for the second, one can only admire the surpassing courage of its enunciator, seeing that it is an innovation which is not only opposed to generally and justly accepted doctrines, but which is directly negatived by the testimony of all original inquirers, who have specially investigated the matter: and that it neither has been, nor can be, supported by a single anatomical preparation. It would, in fact, be unworthy of serious refutation, except for the general and natural belief that deliberate and reiterated assertions must have some foundation.

Before we can discuss the first point with advantage we must consider with some attention, and compare together, the structure of the human hand and that of the human foot, so that we may have distinct and clear ideas of what constitutes a hand and what a foot.

The external form of the human hand is familiar enough to every one. It consists of a stout wrist followed by a broad palm, formed of flesh, and tendons, and skin, binding together four bones, and dividing into four long and flexible digits, or fingers, each of which bears on the back of its last joint a broad and flattened nail. The longest cleft between any two digits is rather less than half as long as the hand. From the outer side of the base of the palm a stout digit goes off, having only two joints instead of three; so short, that it only reaches to a little beyond the middle of the first joint of the finger next it; and further remarkable by its great mobility, in consequence of which it can be directed outwards, almost at a right angle to the rest. This digit is called the *"pollex,"* or thumb; and, like the others, it bears a flat nail upon the back of its terminal joint. In consequence of the proportions and mobility of the thumb, it is what is termed "opposable"; in other words, its extremity can, with the greatest ease, be brought into contact with the extremities of any of the fingers; a property upon which the possibility of our carrying into effect the conceptions of the mind so largely depends.

The external form of the foot differs widely from that of the hand; and yet, when closely compared, the two present some singular resemblances. Thus the ankle corresponds in a manner with the wrist, the sole with the palm; the toes with the fingers; the great toe with the thumb. But the toes, or digits of the foot, are far shorter in proportion than the digits of the hand, and are less moveable, the want of mobility being most striking in the great toe—which, again, is very much larger in proportion to the other toes than the thumb to the fingers. In considering this point, however, it must not be forgotten that the civilized great toe, confined and cramped from childhood upwards, is seen to a great disadvantage, and that in uncivilized and barefooted people it retains a great amount of mobility, and even some sort of opposability. The Chinese boatmen are said to be able to pull an oar; the artisans of Bengal to weave, and the Carajas to steal fishhooks by its help, though, after all, it must be recollected that the structure of its joints and the arrangement of its bones, necessarily render its prehensile action far less perfect than that of the thumb.

The Bony Framework . . .

But to gain a precise conception of the resemblances and differences of the hand and foot, and of the distinctive characters of each, we must look below the skin, and compare the bony framework and its motor apparatus in each.

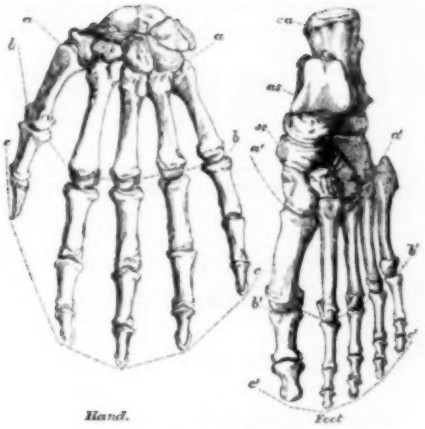
The skeleton of the hand exhibits, in the region which we term the wrist, and which is technically called the *carpus*—two rows of closely fitted polygonal bones, four in each row, which are tolerably equal in size. The bones of the first row with the bones of the forearm, form the wrist joint, and are arranged side by side, no one greatly exceeding or overlapping the rest.

Hands and Feet of Gorillas are comparable to man's and different from those of monkeys.

HUXLEY

continues the comparison

IN THE NEXT CLASSIC OF SCIENCE



HAND AND FOOT

The skeleton of the hand and foot of man reduced from Dr. Carter's drawings in Gray's 'Anatomy.' The hand is drawn to a larger scale than the foot. The line a a in the hand indicates the boundary between the carpus and the metacarpus; b b that between the latter and the proximal phalanges; c c marks the ends of the distal phalanges. The line a' a' in the foot indicates the boundary between the tarsus and metatarsus; b' b' marks that between the metatarsus and the proximal phalanges; and c' c' bounds the ends of the distal phalanges: ca, the calcaneum; as, the astragalus; sc, the scaphoid bone in the tarsus. (Reproduced from "Evidence as to Man's Place in Nature.")

The four bones of the second row of the carpus bear the four long bones which support the palm of the hand. The fifth bone of the same character is articulated in a much more free and moveable manner than the others, with its carpal bone, and forms the base of the thumb. These are called *metacarpal* bones, and they carry the *phalanges,* or bones of the digits, of which there are two in the thumb, and three in each of the fingers.

The skeleton of the foot is very like that of the hand in some respects. Thus there are three phalanges in each of the lesser toes, and only two in the great toe, which answers to the thumb. There is a long bone, termed *metatarsal,* answering to the metacarpal, for each digit; and the *tarsus* which corresponds with the carpus, presents four short polygonal bones in a row, which correspond very closely with the four carpal bones of the second row of the hand. In other respects the foot differs very widely from the hand. Thus the great toe is the longest digit but one; and its metatarsal is far less moveably articulated with the tarsus, than the metacarpal of the thumb with the carpus. But a far more important distinction lies in the fact that, instead of four more tarsal bones there are only three; and that these three are not arranged side by side, or in one row. One of them, the *os calcis* or heel bone (*ca*), lies externally, and sends back the large projecting heel; another, the *astragalus* (*as*), rests on this by one face, and by another, forms, with the bones of the leg, the ankle joint; while a third face, directed forwards, is separated from the three inner tarsal bones of the row next the metatarsus by a bone called the *scaphoid* (*sc*).

Thus there is a fundamental difference in the structure of the foot and the hand, observable when the carpus and the tarsus are contrasted; and there are differences of degree noticeable when the proportions and the mobility of the metacarpals and metatarsals, with their respective digits, are compared together.

The same two classes of differences become obvious when the muscles of the hand are compared with those of the foot.

Three principal sets of muscles, called "flexors," bend the fingers and thumb, as in clenching the fist, and three sets, —the extensors—extend them, as in straightening the fingers. These muscles are all "long muscles"; that is to say, the fleshy part of each, lying in and being fixed to the bones of the arm, is, at the other end, continued into tendons, or rounded cords, which pass into the hand, and are ultimately fixed to the bones which are to be moved. Thus, when the fingers are bent, the fleshy parts of the flexors of the fingers, placed in the arm, contract, in virtue of their peculiar endowment as muscles; and pulling the tendinous cords, connected with their ends, cause them to pull down the bones of the fingers towards the palm.

Not only are the principal flexors of the fingers and of the thumb long muscles, but they remain quite distinct from one another throughout their whole length.

In the foot, there are also three principal flexor muscles of the digits or toes, and three principal extensors; but one extensor and one flexor are short muscles; that is to say, their fleshy parts are not situated in the leg (which corresponds with the arm), but in the back and in the sole of the foot—regions which correspond with the back and the palm of the hand.

Again, the tendons of the long flexor of the toes, and of the long flexor of the great toe, when they reach the sole of the foot, do not remain distinct from one another, as the flexors in the palm of the hand do, but they become united and commingled in a very curious manner—while their united tendons receive an accessory muscle connected with the heel-bone.

But perhaps the most absolutely distinctive character about the muscles of the foot is the existence of what is termed the *peronaeus longus,* a long muscle fixed to the outer bone of the leg, and sending its tendon to the outer ankle, behind and below which it passes, and then crosses the foot obliquely to be attached to the base of the great toe. No muscle in the hand exactly corresponds with this, which is eminently a foot muscle.

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CHEMISTRY

Vitamin A Concentrated In Halibut Liver Oil

A SOURCE of vitamin A, more than a hundred times as potent as cod liver oil, the present standard "bottled sunshine," has been found in oil from the liver of the food fish halibut. Halibut liver oil contains an unusually large concentration of vitamin D. These discoveries come from the joint research of scientists of two pharmaceutical laboratories. The workers are Dr. A. D. Emmett and Dr. O. D. Bird of Detroit and Dr. C. Nielson and Dr. H. J. Cannon of Chicago.

In spite of the great potency of the new therapeutic agent, overdoses do not appear to be dangerous. Laboratory test animals were given daily doses containing ten thousand times the amount of vitamin A and four hundred times the quantity of vitamin D called for in normal treatment. They became normal without showing bad effects.

Halibut liver oil was characterized as "superconcentrated sunshine." It was said to contain not less than fifty thousand vitamin A units per gram.

"Under strictly comparable conditions," the report of the four research chemists stated, "the growth produced in experimental animals by halibut liver oil compares favorably with that produced by doses of cod liver oil one hundred times greater. The halibut oil, as prepared by special methods of extraction, has as a rule from one hundred to one hundred and ten times the vitamin A potency of a five hundred unit per gram cod liver oil. The vitamin D content of halibut liver oil, which has never been previously investigated, was also found to be unusually high."

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MEDICINE

Course of Disease Traced In Prints of Human Tongue

HOW TONGUE PRINTS made on smoked paper show the course of certain diseases was explained by Dr. William S. Middleton, associate professor of medicine at the University of Wisconsin Medical School, at the meeting of the American College of Physicians.

In pernicious anemia, for example, and in a number of other diseases such as pellagra, sprue, and anemias due to pregnancy, to tapeworm infestation or certain other conditions, the tongue becomes inflamed and eventually wastes and shrinks. The smoked paper prints show the progress of this condition of the tongue. In the case of pernicious anemia under the liver treatment, the tongue becomes normal again and this is shown on the paper prints. These may be shellacked and thus make a permanent record for future study, Dr. Middleton said.

Apparently the different types of anemia, pellagra, sprue and certain other conditions, are related through some common but still unknown factor. Some one vital substance, for example, may be lacking in the body and the various features of these diseases may result from its absence. Since this condition of the tongue is one thing which all these diseases have in common, its study through the smoked paper prints may reveal important facts about the cause of the diseases, Dr. Middleton explained.

Science News Letter, April 9, 1932

METEOROLOGY

Sun, Moon and Heat Cause Tides in Air Above Earth

DISCOVERY of three kinds of tides in the ocean of air above our heads was announced by Prof. J. Bartels, German meteorologist and research associate of the Carnegie Institution of Washington's department of terrestrial magnetism, when he summarized a series of researches into barometer readings.

Atmospheric tides have greater regularity than the tides of the oceans but they are masked more effectively from simple detection by the great variations and irregularities of the atmosphere which cause our weather, Prof. Bartels reported.

The same gravitational forces of the sun and moon which cause the tides of the oceans produce part of the rhythmical oscillations in the atmosphere, but the daily heating and cooling of the air also exerts its influence.

Prof. Bartels summarized three mathematical harmonic analyses, using thousands of readings of the barometer at all parts of the earth. Buried within the great irregularities of the barometer which show the march of fair and storm areas over the face of the earth, Prof. Bartels found three distinct types of oscillations of striking symmetry. There is a twelve-hourly tide due to the sun, a lunar wave which is exactly the sort of tide that theory says the moon's gravitation should produce, and an eight-hourly wave that is caused by the variation in heat of the atmosphere and is built up by resonance.

Scientists at the Carnegie Institution studying the electrical and magnetic conditions of the earth are interested in the tidal variations in the atmosphere because they help in the interpretations of the systematic variations of the earth's magnetism during each day. The variations of the earth's magnetism in turn are the main sources of information about the physical state of the outermost layers of the earth's atmosphere and the effect that cosmical influences have on the earth.

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BIOLOGY

Expedition to Study Life Off Mexican Coast

AN EXPEDITION of scientists who will collect specimens and make observations on the plant and animal life of islands off the Mexican coast and southward to the shores of Ecuador has left San Francisco on the yacht *Zaca*. An announcement of the details of the expedition's plans and personnel are made in *Science* by Dr. Barton W. Evermann of the California Academy of Sciences, which sponsors the expedition. The cruise is backed by Templeton Crocker of San Francisco, owner of the *Zaca*.

Among the apparatus carried for the study of deep sea life is an electrically illuminated trap which can be sunk to great depths. It is hoped that this will make possible the capture of creatures of the dark abysses, attracted by the light. It is expected that the expedition will bring back large collections representing all classes of land and marine life for the museum of the academy.

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IN SCIENCE

MICROBOLOGY

Microbes Live in Foods Below Freezing Point

SOME food-destroying microbes are unharmed and continue to multiply below freezing temperature, Dr. C. A. Magoon of the U. S. Department of Agriculture told the American Chemical Society.

The old belief that freezing destroys microorganisms that cause decay in food must be revised, said Dr. Magoon. While the majority of these microbes are usually killed by freezing temperatures, there is ordinarily a small proportion of survivors whose vitality is unaffected by temperatures below freezing.

Some microbes, said Dr. Magoon, have been found to resist temperatures as low as minus 422 degrees Fahrenheit for as long as ten hours with no apparent harmful effect.

These cause alterations in the color, flavor, and healthfulness of foods, which depend on the particular organism concerned. Dr. Magoon is studying intensively the physical and chemical nature of these changes.

Three main groups of microorganisms, explained Dr. Magoon, are responsible for this spoilage of frozen foods: molds which thrive practically anywhere, yeasts which attack sugar-containing products such as fruits, and bacteria which act on meats and other substances rich in proteins.

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ENTOMOLOGY

Spider's Eggs Form Pattern Like Mosaic of Pebbles

See Front Cover

LIKE a rough mosaic of pebbles is the array of spider's eggs photographed by Cornelia Clarke and reproduced on the cover of this week's SCIENCE NEWS LETTER. Although smaller than small pin-heads, the enlarging lens brought the eggs up to such apparent size that they were guessed to be puffballs, mouldy grapes, and a number of other objects of similar size by persons to whom the photograph was first shown.

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NCE FIELDS

ANATOMY

Right or Lefthandedness Decided Before Birth

THE QUESTION of whether a person will be naturally righthanded or lefthanded is decided before birth, Miss Stella M. Leche of the department of anatomy, Tulane University, told members of the American Association of Anatomists.

Miss Leche has studied the ridges and surface markings of the palms of 244 lefthanded persons and compared them with those of 300 persons chosen at random. These markings on the skin of the palm are known to be different for the right and left hands. Likewise, they show which is the dominant hand, that is whether the person tends to use the right or the left hand for writing, cutting and other similar tasks.

Since the nature of the markings on the palms is determined long before birth, Miss Leche concluded that the matter of which hand will be dominant is also decided at this early period in the individual's life.

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ENTOMOLOGY

Spider Bite Poisoning Reported on Increase

POISONING from spider bites is increasing, Dr. Emil Bogen of Olive View, Calif., told members of the American College of Physicians at their meeting in San Francisco. He estimated that there are hundreds and possibly thousands of cases of this condition in the United States every year. Nearly 400 cases of poisoning from the bite of the Black Widow spider have actually been reported and twenty cases of it were seen at a single Los Angeles hospital in the past year alone, he stated.

"Several death certificates were made out from this cause in California during the past year and several others reported in the newspapers and in personal communications," he said, "so that even though the mortality rate is very low, the possibility of fatal termination cannot be disregarded."

Dr. Bogen urged that the condition be given more consideration in the medical school. If physicians knew more about the condition and were familiar with its symptoms fewer patients would be subjected to the unnecessary operations which occasionally are performed on victims of spider bite poisoning, he pointed out.

Arachnidism, which is the medical term for spider bite poisoning, seems almost always to be due to the bite of the Black Widow or Shoebutton spider, Dr. Bogen said. This spider may be easily recognized by the bright red patch, shaped roughly like an hourglass, on its black, globular abdomen. Also it may be known by its web, which consists of straggly, uneven, coarse, sticky threads running in all directions in all three dimensions. It has none of the geometrical exactitude which gives to webs of certain other spiders their aesthetic charm, Dr. Bogen said. The Black Widow spider is found over more than half the United States. People should be taught to recognize it and to destroy the spider, web and eggs, to protect themselves from its bite, he urged.

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PHYSICS

Light Velocity is Key to Other Numerical Constants

PHYSICISTS have acknowledged that light's velocity is one of the most fundamental constants of nature, and now Prof. J. E. Mills, University of South Carolina chemist, has discovered that this speed is a numerical masterkey for computing other constants used in science.

By using a formula that involves the velocity of light as the circumference of a circle and certain other relations involving the velocity of light, Prof. Mills has been able to derive with great numerical accuracy the values for the geometrical constant, the mass of the electron, the mass of the proton, Planck's constant, the electronic charge, the gravitation constant, and Boltzmann's constant, all of which are familiar to physicists. It is necessary to ignore the placing of the decimal point, however.

Prof. Mills believes that it is not possible that any merely accidental agreement could produce the numerical agreement he has achieved and he therefore suggests that the relationships he has found are real and not merely mathematical.

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ARCHAEOLOGY

Scientist Denies Link Between Egypt and Mexico

A DECIDED blow to the theory that American Indians borrowed the best things of their civilization from wise old Egypt is dealt by Dr. James H. Breasted, eminent Egyptologist of the Oriental Institute, at Chicago.

Dr. Breasted has just returned from Mexico, where he examined the ruins of Mayan Indian temples in Yucatan.

"There is nothing in Mayan art which remotely suggests any connection whatever with Egyptian or Oriental art," declared Dr. Breasted in response to a request from Science Service.

Alleged similarities to Egyptian and Chinese art detected in sculptures and paintings on ruined Mayan temples have been brought to public notice by various observers. If any of the beautiful and intricate designs wrought by Mayan Indians could be identified as definitely Egyptian in origin, it would be impressive evidence to bolster up the theory that the Indians borrowed or imported their civilization. Most American archaeologists, however, hold the view that the American Indians built up their own civilization unassisted.

To Dr. Breasted's verdict that he found no significant trace of Egyptian art in Yucatan, he added the statement:

"In the vast majority of cases the developments of the leading Mayan art motifs can be followed out of their indigenous sources in the Western Hemisphere."

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PUBLIC HEALTH

English Camp to Benefit Health of Unemployed

A CAMP for unemployed men is being organized in England with the object of keeping up the physical and mental health of the men so that they will be fit to re-enter employment if opportunities present themselves through a revival of trade.

"Chronic unemployment almost inevitably leads to deterioration of physical and mental health," sponsors of the movement point out in a note to *The Lancet*, in which they ask for names and addresses of young men suitable for the first groups at the camp.

Regeneration of men already demoralized by prolonged unemployment will be undertaken as soon as possible.

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PHYSICS

European Scientists Study Neutron, Latest Atomic Part

Not Known Whether New Physical Concept, Combination of Electron and Proton, Is Material Particle or Radiation

By DR. VICTOR COFMAN,
Science Service Correspondent

LEADING physicists in Europe are making investigations to detect the neutron, latest of the atomic parts to be revealed by science.

The negatively charged electron and the positively charged proton have been known and measured for years. But the neutron, supposed to be a close combination of the electron and the proton, is just now receiving experimental support. It has no detectable electric charge and leaves no finger-prints in the form of ionized or electrified particles to mark its passage in a gas.

"It is not certain at present whether we are dealing with material particles or with radiation." le duc Maurice de Broglie said to me. He is a member of the French Academy of Science and one of France's foremost physicists. He continued:

"The facts so far known about the peculiar rays whose nature is being investigated, do not agree completely either with the 'quantum' or with the 'neutron' hypothesis. It is difficult to devise crucial tests that will distinguish between them. If it could be shown that the rays are even very slightly affected by an electro-magnetic field, that would definitely prove their material nature, because quanta could not be so affected."

Prof. W. Bothe of Giessen, Germany, first obtained these powerful rays by bombarding beryllium with the alpha rays of polonium. This alpha radiation really consists of helium nuclei, that is, positively charged material particles. Prof. Bothe thought that the powerful secondary rays thus obtained were "quanta" of radiation, super-gamma rays approaching cosmic rays in energy, and similar to radio or light waves, only much shorter. He ascribed them to the transmutation of beryllium nuclei of weight nine into carbon nuclei of weight thirteen by the capture of alpha rays, which are helium nuclei of weight four.

Later Mme. Curie-Joliot and Monsieur F. Joliot of the Curie Institute of Paris showed that when the secondary beryllium rays strike hydrogen-containing substances, they again produce positively charged particles with very high energy, an effect which is not readily compatible with the view that the secondary beryllium rays are quanta, that is, electro-magnetic radiation, like gamma rays.

Immediately after, Dr. J. Chadwick of the Cavendish Laboratory of the University of Cambridge, England, as a result of similar experiments, put forward the view that the mysterious beryllium rays are the long-searched-for neutrons. According to his hypothesis, when the beryllium nucleus captures an alpha-particle, it adds only three units to its weight, transforming itself into carbon of atomic weight twelve. The extra unit of "matter" becomes a neutron consisting of a proton of mass one, together with an electron of negligible mass. The two are supposed to be closely bound together—not with the electron revolving in a relatively large orbit, as happens within the atom of hydrogen.

Dr. Chadwick had been led to assume the transformation of beryllium nine into carbon twelve in order to account for the enormous energy of the recoil protons produced from the nitrogen atoms struck by the rays, which can produce some 30,000 ions and have therefore an energy of about 52 million volts.

The positively charged protons can be detected in two ways: either by causing water vapor to condense along their path, or by detecting, after enormous amplification, the minute electric current produced in a special ionization chamber by the passage of the proton. This second method has been used in de Broglie's laboratory in Paris by L. Leprince-Ringuet.

Other experiments on boron and fluorine atoms, made by Dr. H. C. Webster of the University of Bristol, seem to support the neutron interpretation, but scientists are eagerly awaiting new developments. Monsieur and Mme. Curie-Joliot are planning to carry out experiments on the Jungfrau to determine the relation of the presumed neutrons to the cosmic rays.

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EMBRYOLOGY

Monkey Colony Opens New Era In Embryological Research

THE ESTABLISHMENT of a monkey colony in which scientists can study every stage in the development of the animal from the formation of the egg to the birth of the baby monkey, has opened a new era in the science of embryology, said Dr. George L. Streeter, of the department of embryology of the Carnegie Institution of Washington at the meeting of the American Association of Anatomists in New York.

From his study of these monkeys, Dr. Streeter found that the maternal body prepares a special place for the fertilized egg to attach itself where the embryo may subsequently obtain nourishment and dispose of its waste products.

This discovery clears up a point which has never been exactly understood by scientists before this, either in the case of monkeys or of human beings, Dr. Streeter explained. Scientists knew that once the egg was attached to the maternal tissues, the growing embryo was able to get nourishment from them, but no one knew whether the arrangements for the exchange of food and waste products were made entirely by the new little organism or by its parent. Now Dr. Streeter has found that there is preparation on both sides.

He was able to make this discovery as a result of earlier studies on monkeys by Dr. Carl G. Hartman of the Carnegie Institution. Because monkeys are so small, Dr. Hartman can tell by manual examination just when the egg leaves the monkey's ovary and when it reaches the womb. He knows at just what stage the egg becomes fertilized. By applying

this knowledge, Dr. Streeter made his discovery that the maternal tissues begin preparations for the fertilized egg before it attaches itself to them.

These preparations consist in forming a marshy place on the interior surface of the uterus or womb. Into this marsh-like tissue, which is kept bathed in blood, the developing embryo shoots little stems called villi which are filled with blood vessels. The blood in these vessels never mixes with the maternal blood, but nourishment and waste materials are exchanged between them by means of gases and soluble material, Dr. Streeter explained.

Study of this process of attachment of the fertilized egg to the maternal tissues and the maternal preparations for it, may shed light on the causes of sterility, of abnormal developments resulting in monsters, and of abortions, Dr. Streeter pointed out. He said that his discovery rested not only on Dr. Hartman's work with monkey eggs, but on the skill in handling the tiny eggs and embryos developed by Dr. Chester H. Heuser of the Carnegie Institution.

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PHYSIOLOGY

Goldfish Experiments May Explain Cause of Obesity

GOLDFISH used in experiments at the California State Prison may shed new light on the cause and treatment of obesity. The effect of diet on the weight of these ornamental animals was investigated by Dr. Leo L. Stanley and Gordon L. Tescher of the prison's medical department and reported to *Endocrinology*.

These investigators studied four goldfish. Two of the fish were fed beef muscle and the other two were fed an equal amount by weight of ground-up glandular substance from the reproductive glands of a ram. The ones getting the beef muscle gained more weight than those getting glandular substance.

From previous experiments the investigators knew that the glandular substance increased the activity of the fish. They assumed that the two diets, beef muscle and glandular substance, were equally adequate as food. Consequently they concluded that the glandular substance increased the energy interchange in the fish bodies as well as the activity and thus kept down the weight of the fish. They pointed out in their report that this may have a bearing on the cause and treatment of obesity.

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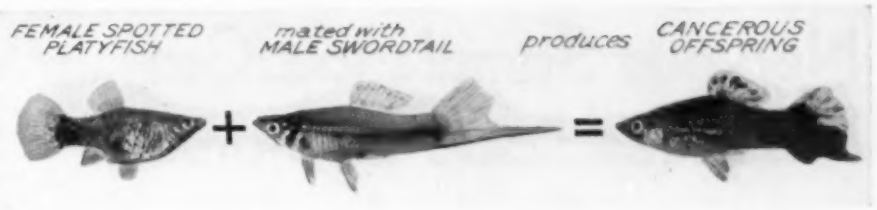

BIOLOGY

Cancerous Fish Object of Scientific Quest in Mexico

ONE of the oddest scientific quests ever undertaken is that of Dr. Myron Gordon of Cornell University into Mexico, looking for cancerous fish.

Dr. Gordon, with two youths as assistants, is now en route to the state of Oaxaca, in the far south of Mexico, in an endeavor to establish that a fish cancer called melanosis actually occurs in nature.

He has produced the tumor unfailingly in the laboratory, by cross-breeding certain species of Mexican killifish, but science has yet to learn if the fish mate in their natural environment in such a way as to produce the disease.

Dr. Gordon's experiments over a period of more than three years give definite indication that melanotic tumor, a disease similar to cancer in human beings, is the result of heredity.

This does not mean that a diseased fish will transmit the cancer to its offspring. Rather the conclusion is that if two healthy fish of certain species are mated, the offspring will die of cancer. The application which this discovery might have to human cancer is far-reaching.

Most Likely Spot

Dr. Gordon has chosen Oaxaca as his destination because it is the one spot in the world most likely to produce cancerous killifish. The fish he crosses to produce the disease in the laboratory are swordtails and spotted platyfish, tiny ornamental creatures that are competing with goldfish for public favor. In nature, so far as he knows, the only location where these two varieties inhabit the same waters is in Oaxaca, and he wishes to learn if they mate there naturally.

Black pigment cells, showing up as black splotches in the fish's skin, are requisite to the disease. It develops exactly as human cancer does, growing as a tumor until parts begin to slough off and the fish eventually dies.

Dr. Gordon emphasizes that he has found no cure for cancer, nor is he seeking one; he is a zoologist, not a physician. What he is after are the fundamental biological facts which underlie the development of cancer.

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MEDICINE

Tourniquet Held Cause Of Shock and Gangrene

THE TOURNIQUET, bound tightly around the arm or leg to stop bleeding, is no longer considered good practice in first aid, it appears from an editorial note in *The Lancet*. The danger of too prolonged pressure with this instrument was emphasized and the tourniquet itself was referred to as "a disreputable relic of the past whose only habitat should be the museum."

For seven years a Belgian physician, Dr. M. Stassen, has dispensed with the tourniquet in the first-aid equipments for which he has been responsible, *The Lancet* pointed out. During that time several hundred cases of compound fractures of the limbs, in which the skin as well as the bones are broken, have been brought to his hospital from points nearly 40 miles away. Not a single death from hemorrhage during transport occurred.

Dr. Stassen thinks the tourniquet is a frequent cause of shock and gas gangrene. By completely stopping the blood circulation in the injured limb, it promotes infection in the crushed and torn tissues. Its removal is followed by absorption of poisons capable of killing a patient already weakened by cold, shock, and loss of blood.

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MEDICINE

Nervous Stimulation Can Produce Ulcers in Stomach

MOST PATIENTS suffering from stomach ulcers and ulcers of the intestinal tract just below the stomach can be helped by medical treatment. Many of them get well, temporarily at least, without any treatment at all. Even in the worst cases, where an operation must be performed, there is slightly better than a four out of five chance for "cure."

This cheerful message was presented to the American College of Physicians by Dr. Walter C. Alvarez of the Mayo Clinic.

Dr. Alvarez described the efforts physicians and surgeons are making to find ways of curing the unlucky patient who does not get well with operation or present methods of treatment.

"Some persons show such a strong tendency to ulcers that if one is cut out another will form within the year," he explained. "Physicians are looking now for ways in which they can recognize these individuals immediately so that the operation can be avoided, or if this is impossible, so designed that there will be much less likelihood of recurrence of the trouble."

Nervous influences play a large part in the disease. Experiments have shown that stimulation of the nerves or irritation of certain parts of the brain will produce ulcers in the stomach. Persons with brain tumor are very apt to get ulcers. There are even cases of persons of nervous temperament who have all the symptoms of ulcer without an ulcer.

"One experimenter has become so convinced of the importance of the temperamental and psychic factors in the production of ulcer that he has given up experimenting on animals and says he will begin again when he finds some way of getting them to worry about the stock market," observed Dr. Alvarez.

"In many cases what the patient needs most is to let down on the strain of life, to shorten hours of labor, and to take a little vacation now and then when the stomach gets to hurting," he advised.

The gastric juice has been found to have a corrosive action on the lining of the digestive tract, but recently a way has been found to protect the walls of the stomach from the acid. This consists in giving washed and dried and powdered mucin from the mucous lining of animals' stomachs.

"Some of the results obtained are encouraging but it is too early yet to estimate the value of this treatment," Dr. Alvarez commented.

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ARCHAEOLOGY

Corroded Coins May Set Date of Persian Palace

ANCIENT COINS, badly corroded, are being closely examined by archaeologists, in the hope that these bits of metal will establish the age of the Persian Palace unearthed in Tepe Hissar, said C. Ross Smith of the University of Pennsylvania Museum, in a radio talk under the auspices of Science Service, over the Columbia Broadcasting System.

The palace, recently unearthed by the museum's Persian expedition, belongs to the Sassanian Dynasty, which ruled between 220 and 650 A. D. Prior to the recent discoveries, not much had been known about this early dynasty.

The palace, built of burnt, sun-dried brick, was admirably planned, Mr. Smith stated. The entrance he described as having been impressively beautiful. The portal was flanked by columns, apparently with life-sized lions as guardian deities. The columns were covered to a height of six feet with richly modeled stucco ornament.

The main hall of the palace was vaulted, and supported by eight large columns. Rich mural paintings in purplish red, blue, carmine, white, and ochre evidently covered the walls. From the fragments that remain, the excavators could distinguish the picture of a horseman at full gallop, other pictures of boars' heads, and the portrait of a smiling Sassanian queen or princess wearing a pearl necklace and with her hair bound in a simple fillet. Some of the pictures contain Sassanian symbols which have not yet been identified, but which may throw an important light on the date of the building, the speaker said.

"The ornaments of some of the vaulted arches are particularly beautiful," he continued, "and clearly indicate unsuspected origins of certain Islamic patterns that were common in sixteenth century Persian carpets. The exact nature of these patterns has hitherto been obscure."

The date when the palace was occupied is tentatively set at about 300 A. D., Mr. Smith reported.

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GEOLOGY

Great Submarine Gorge Acted As Dump Cart for Glaciers

HOW the mysterious "new" submarine canyon in the sea floor off Georges Bank and the New England Coast made its sudden debut by acting as a huge dump wagon, sliding its load of Ice-Age debris out when jarred by an earthquake, is told by Prof. Francis Parker Shepard of the University of Illinois.

Corsair Gorge is the name of the new feature on oceanographic maps of the North Atlantic. It apparently wasn't there before the earthquake of November, 1929, which wrecked most of the transatlantic cables off the Grand Banks, 600 miles to the north. It was there by Christmas of the same year, when it was first detected by the sounding apparatus of the steamer *Transylvania*. Its presence was confirmed through a careful survey by the U. S. Coast and Geodetic Survey.

Corsair Gorge stood as a challenge and a mystery to oceanographers. It did not appear to be the result of a sudden drop in the ocean floor. Neither did it seem to be a drowned river valley.

Prof. Shepard disposes of its newness by advancing the hypothesis that it is not new at all. He holds that the gorge originated as a deep cut, excavated by a river when the land was much higher than at present, probably millions of years ago. Then subsidence of the land decreased the valley. Later, during the

glacial period when the sea level was hundreds of feet lower than now, great ice sheets spread out onto Georges Bank. Debris carried from the terminus of the ice by a network of streams probably filled the gorge till it lost its topographic expression.

So it stood for many thousands of years, perhaps until the recent earthquake gave it a kick. Then, like the load of a dump-wagon jolted from underneath, the accumulated debris slowly slid out of the trough, leaving it empty and ready for discovery by the first passing steamer with echo-sounding apparatus.

The movement was so slow that surface waves violent enough to betray the disturbance were not formed. Soundings of the ocean bottom at the mouth of the gorge reveal a zone of hummocks formed of the displaced sediments, further evidence of the great submarine landslide.

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MEDICINE

New Weapons Forged To Fight Scarlet Fever

NEW WEAPONS with which to conquer scarlet fever, one of childhood's most serious diseases, have been forged by the scientific research division of the U. S. Public Health Service.

Chief of the new weapons is a scarlet fever streptococcus toxoid, a product which may be injected into a child's body to build up his resistance to the disease. This toxoid has been given to about 1,000 children and has given them much greater protection against the disease than any method heretofore used.

Toxoid is the poison of the scarlet fever germ to which has been added the chemical, formalin, and which has then been incubated for several months during which time it loses its poisonous property but retains ability to give protection against the disease.

The other weapons the government scientists have forged are a concentrated and purified scarlet fever toxin, for use in testing and in preparing the protective toxoid; and the development of a suitable laboratory animal method for the standardization of the scarlet fever toxin and antitoxin. This method shows great promise and as soon as possible will be made available to other laboratories interested in producing scarlet fever toxin and antitoxin.

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Red foxes are better mousers than cats.

ARCHAEOLOGY

Ancient Earth of Mexico Reveals New Treasure Tomb

Disks and Belts of Beaten Gold Among Valuable Articles Taken From Sepulcher Discovered by Indian Farmer

THE ANCIENT EARTH of Mexico has revealed another rich old Indian treasure tomb. It is second only to the great archaeological discovery at Monte Alban that in January astounded the archaeological world.

Beaten gold, carved images, green jade, and obsidian objects were unearthed from this new-found tomb in a hitherto uncharted archaeological site. The site is at Texmelincan, one hundred twenty miles south of Mexico City, in the State of Guerrero. The area about the tomb is covered with archaeological mounds, concealing no one knows what manner of buildings and remains.

An Indian farmer discovered the tomb. The rare and beautiful articles were removed secretly into the safe keeping of the Mexican Department of Archaeology.

Outstanding among the discoveries is a great disk of beaten gold, eight inches in diameter. The disk has a hole in the center. On the disk are carved two intertwined plumed serpents, familiar and important symbols in ancient Mexico. The plumed serpents are portrayed with fifty-two vertebrae, probably symbolizing the fifty-two years in the Mexican century. The head of a warrior protrudes from each serpent's gaping jaws.

Jade Necklace

Among the other rich Indian adornments in the tomb are two belts made of thin gold sheeting. These beaten-gold belts are two feet long and three inches wide. A necklace of seventy-one unusually fine carved green jade beads is another rare ornament. There are also large gold earrings, a necklace of thirty-two hollow gold beads, many pieces of carved jade, three necklaces of shell and stone beads, twenty-one copper bells, and four huge obsidian earrings, painted red.

From the tomb also were taken three onyx vases, a stone idol, four finely polished pottery vessels, apparently Toltec, and much plain pottery, some of it filled with red mercury paint and also blue mineral.

Some clues to the identity of the people who made the tomb have already been noted among the tomb objects. Serpent symbols, as well as the carved pottery, suggest the Toltec style. Symbols of Xipetotec, god of the flayed, adorn some of the pieces. Eleven copper rings are carved with Xipetotec symbols.

The nearest important ancient city to the scene of the tomb discovery is Xochicalco. This large ruin is noted for its plumed serpents and its "Toltec-Maya" style, though it is far from the Yucatan Peninsula, where the Mayan civilization flourished.

Gold-Lined Skulls

Craniums lined with gold-leaf, and gold handles that appear to belong to scepters are strange and shining objects also taken from the tomb. The curious device of lining craniums with gold leaf is said by archaeologists to have been an ancient custom among Indians in the State of Oaxaca, to the east of Guerrero. Gold leaf to the weight of a pound has been gathered up.

The Indian farmer who made the Guerrero tomb discovery found two fine stone corn grinders among the objects in the tomb. From this it appears that some of the occupants, buried with their rich possessions, were women. The number of burials has not yet been determined.

Some of the objects from this new tomb are pronounced unique. There is, for example, a miniature turquoise mask of the wind god Ehecatl. There is also a bird's head made of turquoise, and many fragments of scattered mosaics.

Of special and absorbing interest to science are the hieroglyphs on some of the objects. These picture writings and three onyx vases stand out as clues which may link the Toltec, Mixtec, Huaxtec, Maya, and other great cultures in south-central Mexico.

The Mexican archaeologist, Enrique Juan Palacios, stated that ancient Indian inhabitants of the Guerrero region were versed in the Toltec calendar.

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ECONOMICS

Valuable Tung Oil Industry Now Developing in America

SHOULD fighting in China continue, Americans will probably have to do less house painting and industry will suffer the loss of a valuable raw material, tung oil.

But a few years hence while Chinamen fight, Americans will be able to keep up house painting and industry's supply of tung oil will not be interrupted.

For a new industrial and botanical revolution, similar to that which took the wild rubber tree out of the Amazon jungles and set it out in orderly plantations, is going on. The tree that supplies $12,000,000 worth of tung oil to the United States each year is being taken from its native China to the far southern states of this country.

Already about 25,000 acres of land here have been planted in trees producing tung oil, Dr. Henry A. Gardner, director of the scientific section of the American Paint and Varnish Manufacturers' Association, told the American Chemical Society recently. He estimates that between 50,000 and 100,000 acres of trees will be needed to supply the quantity of oil that has been imported from China.

"Tung oil trees have been grown successfully in California. Alabama, Louisiana, Mississippi and Florida," Dr. Gardner said. "However, California is not considered a favorable state for the commercial growing of the trees because of the lack of low priced land in sections where the soil and climate conditions are suitable. The largest plantings have been made in northern Florida."

Seed of a tree of the genus *Aleurites*, which is native to China, produce tung oil. They ripen about October in both China and North America and are crushed in a mill similar to that used to press peanuts for peanut oil. The fruit which contains the seed is about the size and appearance of a small russet apple.

The tree is deciduous, shedding its leaves in the fall and covering itself with new foliage in the spring. It will stand light frosts.

The Chinese use tung oil for waterproofing, making native lacquer and ink. In this country, in addition to its applications in the manufacture of varnishes and varnish paints, it is "used in making insulating compounds, as an ingredient in automobile brake linings, in gaskets for steam pipes, in linoleum and table oilcloth, for waterproofing fabrics, paper cartridge shells, etc., as a binder for wall board and plastic synthetic lumber, or lacquers, primers, pipe coating plastics, synthetic resins, battery jar compounds, airplane tubing fillers, etc."

The first tung oil seed were brought to this country in 1905 by David Fairchild, plant explorer of the U. S. Department of Agriculture, and planted at the government experiment station at Chico, Calif. Seedlings were distributed to southern states. Extensive plantings, however, were not made until eight years ago.

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CHEMISTRY

Chemical Nature of Vitamin C Explained

SCURVY-PREVENTING vitamin C has been obtained in crystalline form and its chemical nature examined, Drs. C. G. King and W. A. Waugh of the University of Pittsburgh report in *Science*. The vitamin C crystals, obtained by the Pittsburgh investigators from lemon juice, are identical with an acid, hexuronic acid, which is formed in plants and functions in the animal body as a reducing agent during normal metabolism. A very small daily dose of these vitamin C crystals protects growing guinea pigs from scurvy when they are otherwise deprived of vitamin C.

Commenting on the recently reported isolation and synthesis of vitamin C by the Norwegian investigators, Dr. O. Rygh and collaborators, Drs. King and Waugh state that the Norwegian work as reported is not in accord with their own findings and that they believe Dr. Rygh's results were misinterpreted.

Dr. Rygh and associates reported that vitamin C is derived from narcotine, a poison found in opium, which is present in unripe fruits but which turns into vitamin C when the fruits ripen.

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On the Radio

The Science Service weekly radio address will be on the subject of

THE PROTECTION OF OUR NATIVE FLOWERS

P. L. Ricker

of the U. S. Department of Agriculture will be the speaker.

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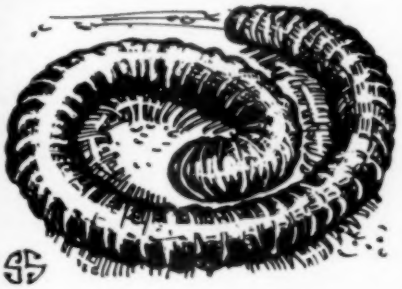
ENTOMOLOGY

Nature Ramblings

By FRANK THONE



"Thousand-Leggers"

THE older zoology books used to call them "millipeds," and class them with the centipedes (or "hundred-footers") into a group they called "myriapoda"; but it all came to the same thing: "milliped" is merely Latin, and "myriapod" Greek, for "thousand feet." But whether in Latin or Greek or English, a name that credits these wiggling soil-dwellers with a thousand feet apiece is an undeserved exaggeration. They may seem to have a thousand feet when they unexpectedly crawl across the back of your hand, or ten thousand when you try to catch one before he gets back into his sheltering crack in the earth, but a mere three hundred is closer to the actual number. Each average thousand-legger is made up of a head and about seventy-five segments or joints, each of which has four legs.

Like almost every unusual crawling thing, the poor thousand-legger is commonly believed to be poisonous; whereas he really is quite harmless. Even his relative, the house centipede, is not poisonous, or at any rate is unable to bite through the relatively tough human skin. Only the large tropical centipedes are seriously venomous. The centipedes, both large and small, are carnivorous, and prey on insects, but the harmless "thousand-legger" is a vegetarian.

But this badge of inoffensiveness is also the sign of his disgrace. For many of the millipeds do considerable damage to the roots of plants, earning the ill title of false wireworms, by analogy with the true wireworms, which are the larval stages of beetles. In general, a "thousand-legger" in your garden is not to be regarded as a friend.

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ZOOLOGY

Stop-Watch Proves Snakes Never Travel at High Speed

SNAKES do not travel at high speed, popular opinion to the contrary notwithstanding. So says Dr. Walter Mosauer, zoologist at the University of California at Los Angeles.

Under repeated tests the famed blue racer snake never exceeded a maximum speed of two and one-half miles per hour. Reports of racing speed are usually the result of mental delusion promoted by fright, both of the observer and the snake, and by the winding motion of the creature.

The method by which a snake propels himself is revealed in a critical investigation described here by Dr. Mosauer. An ingeniously planned research, in which the X-ray camera, scalpel and stop-watch were featured, included everything from African vipers to boa constrictors. From the report it is evident that the serpent's inside power plant is much more complicated than his externals.

Devoid of legs, fins or other reasonable propeller mechanism, the snake makes up for these shortages with an elaborate muscular layout. In general his backbone is connected with his ribs by a host of strap muscles, each tied to at least one vertebra and one rib.

Sometimes a rib is connected to a joint sixteen ribs away, sometimes to one near by. These connections permit any kind of wiggle or bend in any direction.

The well-known but mystifying locomotion of the "side-winder" rattlesnake was studied by Dr. Mosauer. The venomous creature apparently prefers to slide sidewise in two parallel tracks over the desert sand. In this performance he corresponds to a two-loop spiral, modified slightly by muscular displacement. Naturally the two loops make parallel tracks. At regular intervals the spiral leaves one track, and a new track is started one space in advance.

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PHYSIOLOGY

Thyroid Gland Activated By Pituitary Gland

THE SMALL GLAND at the base of the brain known as the pituitary gland produces a hormone which acts as a thyroid "starter" or activator, it appears from the report of Dr. Frank H. Figge and Dr. Eduard Uhlenhuth of the University of Maryland Medical School to the American Association of Anatomists meeting in New York.

These investigators found that although the thyroid gland is responsible for the change from the larval to the grown-up stage in the axolotl, an animal related to the salamander, the thyroid cannot bring about this change by itself.

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• First Glances at New Books

Psychology

THE NATURE AND TREATMENT OF STAMMERING—E. J. Boome and N. A. Richardson — *Dutton,* 135 p., $1.50. The authors, who are English, point out that faulty treatment may be partly the result of faulty classification of the trouble. "Stammering is still listed among 'speech defects,' whereas it should be under some such heading as 'nervous disorders'," they believe. Results obtained at a center for stammering children in London are discussed.

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Exploration

SEARCH—Lincoln Ellsworth—*Brewer Warren and Putnam,* 184 p., $4. Doubtless everyone has a hankering to take an explorer apart to see what makes him go. In this book one of the foremost of the new generation of explorers—who use wings, but are no less heroic and daring than the old defiers of the ice—obligingly does it for us. His saga of air pioneering in the Arctic would have earned an ungrudging "skoal!" from stout Eric the Red himself.

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Library Science

THE AMERICAN YEAR BOOK, 1931—Edited by A. B. Hart and William M. Schuyler—*American Year Book Corp.,* 937 p., $7.50. A concise summary of American progress during the past year in twenty-seven fields as diverse as surgery and philosophy, politics, aviation and education. A list of societies and research institutions follows each section, and an index at the end of the volume makes every bit of information readily available to the reader. It is a valuable cross-section of American life and a splendid reference book for students and professional men.

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Chemistry

VEGETABLE FATS AND OILS—George S. Jamieson—*Chemical Catalog,* 444 p., $6.50. The book, which is one of the American Chemical Society Monographs, carries as a subtitle, "The chemistry, production and utilization of vegetable fats and oils for edible, medicinal and technical purposes." The author is chemist in charge of the oil, fat and wax laboratory of the Bureau of Chemistry and Soils of the U. S. Department of Agriculture. The aim of the book is to compress within the limits of a small volume as much information as possible in regard to the vegetable fats and oils. The oils themselves are classified under the headings of non-drying, semi-drying and drying. A section on methods, most of which have been tested in the author's laboratory, and an appendix of data, are included.

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Ornithology

THE MIGRATION OF BIRDS—T. A. Coward—*Cambridge Univ. Press,* 137 p., 2s. 6d. A third printing of a handily pocket-fitting book on the ways of birds in the air, by a well-known English author.

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Biology

THE MACHINES WE ARE—R. T. Hance — *Crowell,* 381 p., $3. Good books often grow like good plants, gradually and unconsciously. A while ago, Prof. Hance had laid upon him the task of giving a series of popular radio talks on biology. A thread of continuity ran through the series, and when he had finished, lo! he had a book on his hands. The principles he discusses hold throughout the realm of living things, but naturally the discussion focuses around that animal in which each of us is most interested, namely, himself. The easy, colloquial style necessary for radio presentation carries over into the book, and makes it the more readable.

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Social Science

BASIC SOCIAL SCIENCE—David Snedden and Genevra Snedden—*Scribner's,* 462 p., $1.40. A well-conceived textbook for junior high school students, which helpfully lets them find out some of the facts for themselves, and thus begin their job of adjusting themselves to the world they must live in.

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Statistics

ILLITERACY IN THE UNITED STATES —Sanford Winston — *University of North Carolina Press,* 168 p., $3. A laborious statistical treatment of rather loosely defined and casually related data. The figures used are those from the 1920 census.

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Astronomy

THE UNIVERSE UNFOLDING—Robert H. Baker—*Williams & Wilkins,* 140 p., $1. This is the story of how the mind of man has explored the universe. Says the author who is professor of astronomy in the University of Illinois: "Standing on a planet so tiny as to be negligible in comparison with its colossal surroundings, man has devised powerful instruments and methods for exploring the universe. He is arraying the bewildering spectacle of the heavens into a comprehensive scheme." Prof. Baker can not complete the story of the discovery of the universe, for research continues with a rush that nearly rivals the recessional velocities of nebulae recently discovered. But here in this book, one of the series keyed to the Century of Progress International Exposition, Chicago, 1933, is the narrative to date.

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General Science

LAS SOCIEDADES CIENTIFICA, LITERARIAS Y TECNICAS DEL MUNDO—Enrique Sparn—*Academia Nacional De Ciencias,* 76 p. A valuable list of the larger scientific societies of the world compiled by the National Academy of Sciences of the Republic of Argentina.

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Geology

BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1929 AND 1930 — J. M. NICKLES—*Government Printing Office,* 280 p., 45c. Of interest to geologists.

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Engineering

THE ROMANCE OF THE MERCHANT SHIP—Ellison Hawks—*Crowell,* 319 p., $3. Although Masefield doesn't give the "Dirty British coaster with a salt-caked smokestack" much credit as against the quinquireme of Nineveh or the stately Spanish galleon, there are those who can still see, in modern steam and motor craft, worthy bearers of the worthiest traditions of the sea. To these, as well as to all who seek the principal facts about the principal ships now afloat, Mr. Hawks' book will be most welcome.

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